

Name: \_\_\_\_\_




Date: \_\_\_\_\_

**Exam: Function Reflections (Solution version 50)**

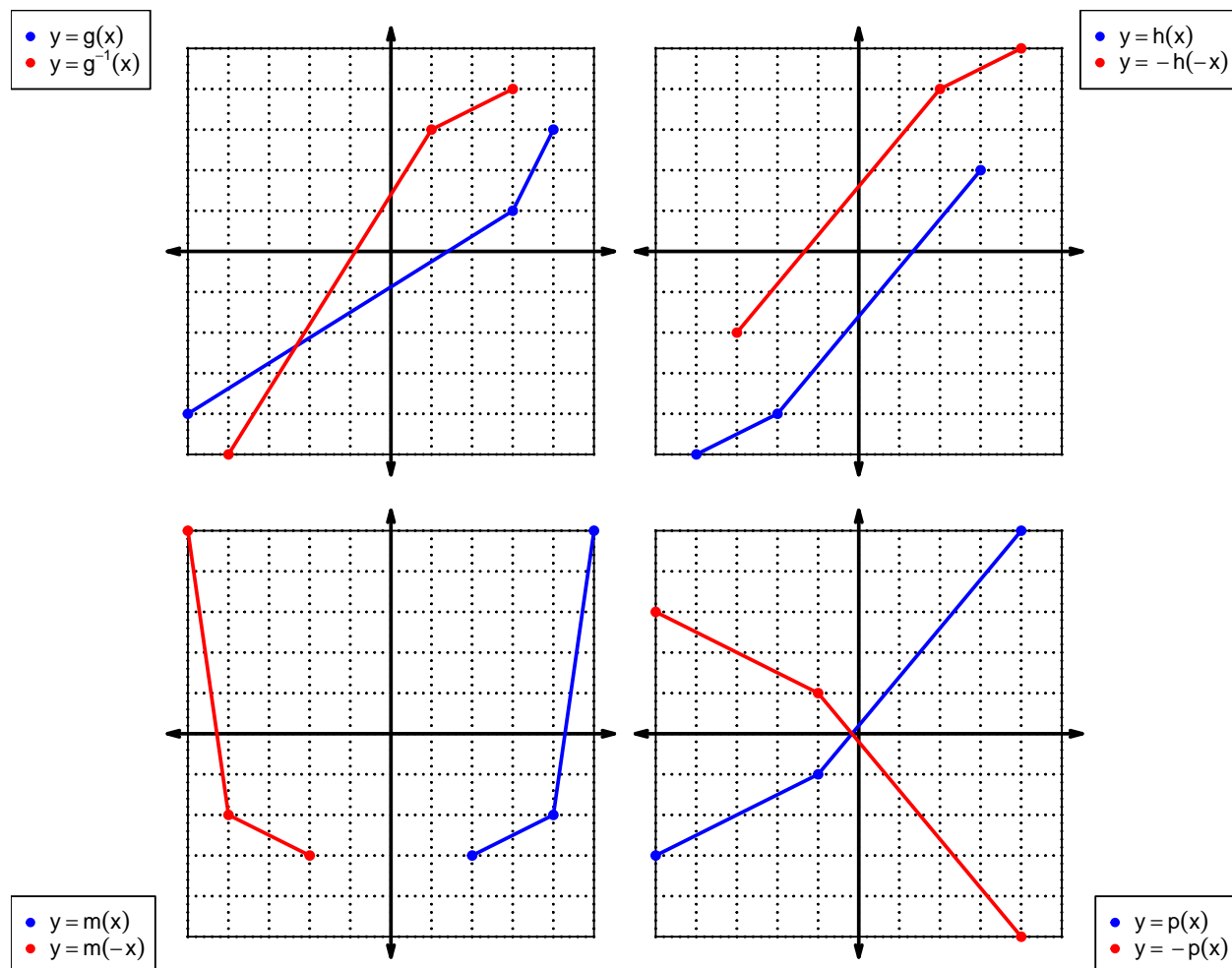
1. Let function  $f$  be defined by the polynomial below:

$$f(x) = -4x^5 - 5x^4 - 3x^3 - 9x^2 + 8x + 7$$

Draw lines that match each function reflection with its polynomial:

Reflections		Polynomials
$-f(-x)$		$4x^5 + 5x^4 + 3x^3 + 9x^2 - 8x - 7$
$-f(x)$		$4x^5 - 5x^4 + 3x^3 - 9x^2 - 8x + 7$
$f(-x)$		$-4x^5 + 5x^4 - 3x^3 + 9x^2 + 8x - 7$

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



## Exam: Function Reflections (Solution version 50)

For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	7	7	4
2	8	3	8
3	5	6	1
4	9	8	2
5	4	9	3
6	2	5	7
7	3	4	5
8	6	1	9
9	1	2	6

3. Evaluate  $g(4)$ .

$$g(4) = 8$$

4. Evaluate  $h^{-1}(1)$ .

$$h^{-1}(1) = 3$$

5. Assuming  $g$  is an **even** function, evaluate  $g(-6)$ .

If function  $g$  is even, then

$$g(-6) = 5$$

6. Assuming  $f$  is an **odd** function, evaluate  $f(-7)$ .

If function  $f$  is odd, then

$$f(-7) = -3$$

## Exam: Function Reflections (Solution version 50)

7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^2 + 1$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^2 + 1$$

$$p(-x) = -x^2 + 1$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(-x^2 + 1)$$

$$-p(-x) = x^2 - 1$$

- c. Is polynomial  $p$  even, odd, or neither?

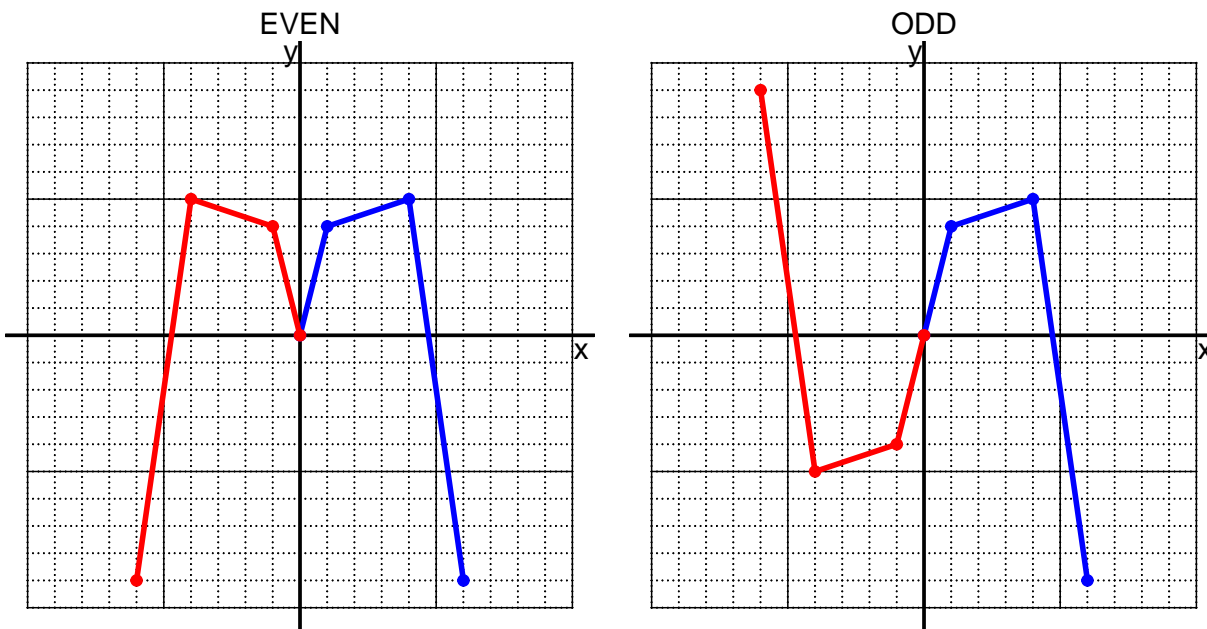
even

- d. Explain how you know the answer to part c.

We see that  $p(x) = p(-x)$  for all  $x$  because  $p(x)$  and  $p(-x)$  are equivalent polynomials. Thus function  $p$  satisfies the criterion for being an even function.

## Exam: Function Reflections (Solution version 50)

8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = 8x - 6$$

a. Evaluate  $f(5)$ .

step 1: multiply by 8

step 2: subtract 6

$$f(5) = 8(5) - 6$$

$$f(5) = 34$$

b. Evaluate  $f^{-1}(10)$ .

step 1: add 6

step 2: divide by 8

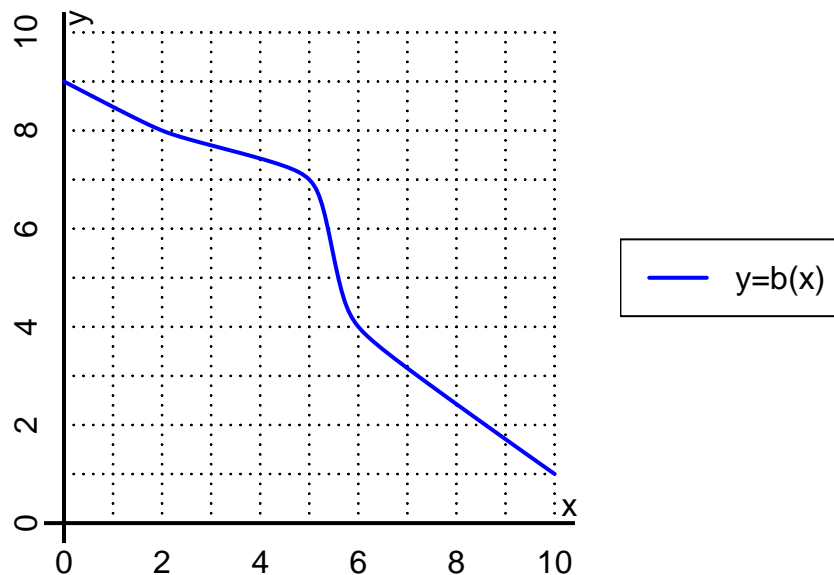
$$f^{-1}(x) = \frac{x + 6}{8}$$

$$f^{-1}(10) = \frac{(10) + 6}{8}$$

$$f^{-1}(10) = 2$$

## Exam: Function Reflections (Solution version 50)

10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(5)$ .

$$b(5) = 7$$

b. Evaluate  $b^{-1}(4)$ .

$$b^{-1}(4) = 6$$

## Exam: Function Reflections (Solution version 50)

11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	8	-8	-8	8
-1	-9	9	9	-9
0	0	0	0	0
1	9	-9	-9	9
2	-8	8	8	-8

b. Is function  $f$  even, odd, or neither?

odd

c. How do you know the answer to part b?

Function  $f$  is odd because column  $-f(-x)$  matches column  $f(x)$  exactly.